

# Climate Change and Groundwater Workshop

Sonoma State University – Student Center  
1801 E. Cotati Ave., Rohnert Park, CA 94918  
May 22, 2019

## Welcome

Ann DuBay, administrator for the Petaluma Valley and Sonoma Valley Groundwater Sustainability Agencies, opened the meeting by introducing Lynda Hopkins, Santa Rosa Plain Groundwater Sustainability Agency Chair, who welcomed the audience and provided a brief overview of the workshop. Hopkins mentioned that the workshop was an experiment to get Board members, Advisory Committee members and stakeholders from the Santa Rosa Plain, Petaluma Valley and Sonoma Valley groundwater sustainability agencies together to be educated and discuss an issue in common to all three basins. Hopefully, there will be future joint workshops, including one on groundwater recharge in the fall.

## Introduction of GSA Boards and Advisory Committee

Lynda Hopkins, Santa Rosa Plain GSA Chair; Susan Gorin, Sonoma Valley GSA Chair; and Bruce Abelli-Amen, Petaluma Valley GSA Vice-chair, each introduced GSA Board and Advisory Committee members in attendance from their respective basin.

## How Climate Science and Models can help us Understand Future Groundwater Challenges

Dr. Lorraine Flint, Ph.ds, and Dr. Alan Flint, Ph.ds, both research hydrologists, spent their careers at USGS. They are now retired and work as emeritus scientists for the USGS California Water Science Center.

Dr. Alan Flint gave an overview of their presentation objectives:

- Climate change and global models
- Downscaling for local applications
- Water balance modelling
- How can we use models to prepare for climate change?

He talked about the issue of global warming and the greenhouse effect. Climate has always fluctuated but has recently increased more than in the last 2,000 years. There has been a noticeable warming since 1980 and all models show an increase in future temperatures. Climate change is a result of global increases in temperature influenced by volcanos, greenhouse gas emissions, and the solar cycle. He gave a summary of a model being a physical or mathematical representation of a process.

Dr. Lorraine Flint, Ph.ds, offered an overview of tools to support groundwater sustainability assessments, followed by the reasons for modelling hydrology and what can be done with a model to look at climate change. She then looked at how urbanization will change the hydrology in local groundwater basins.

## What's happening now: Regional Water Resource Climate Adaptation

Jay Jasperse, Chief Engineer and Director of Groundwater Management for Sonoma Water and Plan Manager for the three Sonoma County GSAs, provided a perspective on water management, how to use the information from the Flints, and four strategies for providing reliable water resources (surface

water, groundwater, recycled water, and conservation). Jay noted that all water is connected, and that we need to take care of our regional water resources. It is important to invest in science and technology as well as collaborate and secure local, state, and federal partnerships.

Science is telling us there are increased temperatures, increased precipitation variability – more severe droughts and floods, increased risk and severity of wildfires, and sea-level rise will have consequences, including in the Sonoma and Petaluma Valley basins. Some examples of Sonoma Water climate adaptation programs include water supply and flood management; flood and emergency management; wildfire resilience; water supply; and climate adaptation planning.

### **The Sustainable Groundwater Management Act and Climate Change**

Paul Wells, Manager of the Water Management Branch, North Central Region, Dept. of Water Resources, presented an overview of SGMA, incorporating climate change data into a GSP, SGMA climate change tools and resources, and how other GSAs are addressing climate change in their GSPs.

Paul referred the audience to the California Department of Water Resources' Climate Change Resource Guide, which gives an overview of the climate change resources including: datasets provided by DWR, tools for working with the DWR-provided datasets, guidance for using DWR-provided data and tools in developing GSP's. The datasets and methods can provide technical assistance to the GSAs for developing projected water budgets. Paul Wells and/or Tad Bedegrew are contact points for questions at DWR.

### **Incorporating Climate Change Information into local Groundwater Sustainability Plans (GSPs)**

Marcus Trotta, Principal Hydrologist, Sonoma Water, communicated an overview of local integrated hydrologic models and discussed some of the questions that models can help address to inform GSPs. He showed integrated model overviews for each GSA and closed with next steps, decisions, and considerations.

### **Questions/Comments**

- Fred Allebach, Sonoma Valley GSA Advisory Committee member – I have studied the DWR disadvantaged community (DAC) mapping tool rather extensively. Sonoma Valley has five to six disadvantaged communities, how will the GSA address them in future if we have integrated water management and they are on municipal water in the middle of the basin without wells?
  - Paul Wells – This is something I would put on the local GSAs as part of the planning if they realize the disadvantaged communities have less reliable water, maybe it should be included in the GSP. There are state grants for disadvantaged, under-represented communities, we need to increase communication and there are programs to facilitate that. For local issues, SGMA expects local GSAs to determine what issues are in the basin and DWR would review that as plans come in or as they are updated over time.
- Gary Quackenbush, North Bay Business Journal – I have been following this process since the beginning. I am concerned about how the GSAs are going to be held accountable for what they don't control?
  - Jay Jasperse – One of the things within SGMA is an adaptive process, this is all new. No one has implemented SGMA yet, so we will see how it plays out. The construct of the statute is that you develop your plan with public input/approval, the state approves it and you implement it and have sustainable criteria for the six undesirable results (locally derived with state approval), If the GSA doesn't make their goals, SGMA can change

strategy and bring in new approaches. So there is some ability to adapt and adjust to uncontrolled circumstances.

- Paul Wells – All GSAs are working on plans to locally control the water in their basin. The State Water Board is the backstop so if the GSAs can't manage it locally, the Water Board would then step in.
- Bruce Abelli-Amen – The Flints indicated working with national-based models downscaled to local level, how do you make the data real on a larger scale?
  - Alan Flint – A set of criteria were developed for choosing climate models. There were ten models and two scenarios. The models were meant to best address California hydrology and climate. We get the models and downscale them to six kilometers, and look at the processes - temperature and precipitation, rain shadow effects, etc. as they all change with elevation. All of the information is taken into account by a series of equations that describe this process over all the different data points. From that information, we can make calculations. Our model, a six kilometer flat cell - if you go down in elevation under this, it will get warmer, if you go higher it will get colder. We ran the model in California and compared it against 180 climate stations in the state for each month. We found we improved the estimate in each of the stations for each month by having the finer scale process. We published a paper and showed how the results for California work, we are incorporating the local climate data from the global models to a finer scale.
- Ann DuBay – To follow on to that, do you also include your soil moisture stages in your modelling?
  - Lorraine Flint - The downscaling part is only for the climate period.
- Matt O'Connor, Santa Rosa Plain Advisory Committee member – Mr. Wells, one of your graphics looked at climate change effects, and you showed mainly single values for increases in temperature and precipitation. The Flints show an increase in temperature but not a lot of certainty if it is going to get wetter or drier, and there is lots of variability. Has there been some change in the consensus in what the GCMs (global climate models) are showing? Obviously, it would be very influential if we knew it was going to get wetter, it would narrow down our choices in how we would address the information from the models.
  - Lorraine Flint – I think there is consensus there will be more atmospheric rivers that come through, and more droughts. All models show this.
  - Alan Flint – Most models show the average as getting wetter long term. We look at the models and look at the risk factors. If it goes in any particular direction, can we handle it?
  - Paul – The graphics are from state-wide data sets. If you have more refined data sets, you would have more specific data.
- Heidi Bauer, Petaluma Valley Advisory Committee member – I have a question for Paul Wells. If DWR can assess fines for taking over the implementation of the plan of the GSP, who would those fines be collected from?
  - Paul Wells – It is actually the State Water Resources Control Board. If any area ended up being unmanaged, it would be for the groundwater diverters. They apply to all diverters except domestic wells (they could be exempt if using 2 acre feet or less). Their intervention is called State Board intervention, you can look it up and find the fees.

- John Shribbs, Petaluma Valley Advisory Committee member – I am concerned about the extremes in the model rather than the averages. Length of a drought, volume of flooding – can we prepare for those extremes and how do we do that?
  - Lorraine Flint – We did a study and looked at potential drought conditions to see if we could be prepared for them. We applied a scenario that looked at the current drought (in 2014), applied the 1977 conditions and the long-term drought of the 1930s, and ran it through the water management models to see if they could handle it. Turns out, given the new processes to manage the Army Corps forecast of operations, there was a period of time when dams did go dry. Historical reality, worked out quite well.
  - Jay Jasperse – We also looked at tree ring data that goes back 500 years. It was a pretty severe drought scenario that we came up with.
- John Shribbs – I am talking about extremes not historical. I am talking about a back-to-back long term 15 year drought. Do any models look at that? What is the impact in those models?
  - Lorraine Flint – Yes, the models have looked at that.
  - Jay Jasperse – That is where groundwater is going to have to come into play if that happens. We have to look at risks and extremes. Is it better to diversity or build bigger reservoirs? We will always have risks.
  - Alan Flint – We have 10 models, two scenarios. We are in the process of running through all our hydrologic models. We hope to have models available for the GSAs soon. Sixteen are available now, four are in process. We are continually moving forward to make this information available. These scenarios include 30-year long-term droughts.
  - Jay Jasperse – One of the strategies that we will rely heavily on is in the dry years, if you can capture the winter rains that do happen and recharge and use that water strategically, that helps a lot. There is a lot of room for improvement in projects like that.
  - Alan Flint – There are two types of droughts – 1) water supply drought and 2) landscape drought. The landscape drought is a very serious issue and leads to some of the major fires we have in California. One rainfall doesn't solve the problem for the landscape.
- Rue Furch, Santa Rosa Plain Advisory Committee member – One of the things that hasn't come up in recent years is the concentration of toxins during droughts. In the instances of protracted drought, will climate change impacts on water quality be analyzed and responded to?
  - Marcus Trotta – SGMA does require that we address water quality. It is one of the more difficult ones. In terms of how climate change can impact water, surface water is probably the first thing to look at, groundwater is more difficult to assess.
- Rue Furch – Things seep into the ground.
  - Marcus Trotta – It is something that needs to be incorporated into the monitoring program and potential projects and actions in the GSP.
  - Alan Flint – One thing we found in southern CA, pulling water from deeper down tends to be lesser quality. The water at the surface is better.
- Jessica (no last name provided) – For the future of our planet, I think we have to reverse climate change, not only stop climate change. I am curious, from the groundwater perspective, what are we using as our baseline today? Maybe we shouldn't only be looking at net zero but positive impacts.
  - Paul Wells - The GSAs are not required to address undesirable results that occurred before January 1, 2015 under SGMA, Water Code 10727.2.

- Jay Jasperse – SGMA is new to everyone. One issue that gets discussed a lot is what happens with the time delay of actions? It is something that is a little murky.

Ann DuBay closed the meeting. She mentioned that the presentations and a taped recording of the meeting will be available online in the following days. She welcomed any input the audience might have that could help plan/be integrated into the Recharge workshop in the fall.